



PHYS 34000 – Modern Physics Laboratory

Syllabus Spring 2025

CLASSROOM: PHYS 346

MEETING TIMES (SECTION, TIME, TA)

001	THU	1:30 – 3:20	TUNCER, HASAN
002	FRI	1:30 – 3:20	ALSURDI, DUHA
003	FRI	11:30 – 1:20	ALSURDI, DUHA
004	THU	4:30 – 6:20	ALSURDI, DUHA

COURSE CREDIT HOURS: 1.00

COURSE WEBSITE: Brightspace

PREREQUISITES: PHYS 241 or 272(H)

INSTRUCTOR: Prof. Leonid Rokhinson

- Office: PHYS 60
- Phone: 765-494-3014
- Email: leonid@purdue.edu
- Office Hours: by appointment

TEACHING ASSISTANTS:

ALSURDI, DUHA	PHYS 318	dalsurdi@purdue.edu
TUNCER, HASAN	PHYS 287	htuncer@purdue.edu

COURSE DESCRIPTION

In this course students will conduct some of the most important experiments that have guided our understanding of physics over the past century. The laboratory experiments illustrate and explore in depth the Modern Physics concepts introduced in PHYS 34200 or 34400. Students will also gain experience in all steps that need to be undertaken by a modern researcher.

LEARNING OUTCOMES

- plan and conduct a modern physics experiment;
- record, analyze, and interpret experimental data;
- write and submit a publication-quality scientific manuscript;
- review a scientific manuscript written by others;
- respond to reviews of a scientific manuscript;
- revise and submit a final manuscript “for publication”.

LAB MANUAL:

You may download the PHYS 340 Lab Manual from Brightspace. Note: Instructions for some of the experiments have changed. Check the revised uploaded documents in Brightspace and consult with your Lab Instructor to see if there are any more updates.

REQUIRED NOTEBOOK:

Avery-Dennison No. 43-648 (or approved equivalent)

RECOMMENDED BOOK:

PRACTICAL PHYSICS by G. L. Squires

ACTIVITIES AND RESPONSIBILITIES:

You are responsible for performing five experiments, submitting your lab notebook for grading, writing a scientific paper, and reviewing two of your classmates' papers. Before each experiment, you need to read the assigned material and record in your lab notebook a summary of the physics involved in your experiment and the plan for the experimental procedure. During the lab session, you will perform the experiments, collect and document the data in your notebook, and then perform the necessary data analysis. Special emphasis is placed on error analysis; the numerical results of experiments must include error margins. You are responsible for contacting the instructors if you need help and submitting your lab notebook for grading twice a semester. You will also write a scientific paper based on one of the experiments and review two of your classmates' papers.

EXPERIMENTS:

You will conduct 4-5 experiments individually or in a group of two or three students. Each student must have their own notebook. While experimental data could be similar for all students in a group, the record of the pre-lab work, the data analysis, interpretation, and conclusions must be done individually.

NOTEBOOK:

During the semester, the maintenance and production of a high-quality hand-written notebook will be emphasized. Your lab notebook will be collected periodically during the semester and graded for content. Please read carefully the lab manual, pages 5-7, about the notebook-keeping practices.

An example of what your lab notes should look like can be found in Brightspace. The lab manual illustrates the level of detail of the notes that you should take while performing these experiments. It also shows some mistakes made by students.

Important: Each lab final write-up should include one "publication quality" computer-generated graph, all final data with error analysis (could be in Excel format), and a discussion of which Modern Physics model (particle vs. wave) it supports.

FORMAL PAPER:

You will also be required to write one scientific paper based on one of the experiments you performed. The paper should follow the general guidelines required for a scientific paper to be published in a modern peer-reviewed scientific journal. These papers will be judged by how well they compare to the publication "Observation of Gravitationally Induced Quantum Interference" by Colella, Overhauser, and Werner. This outstanding publication is analyzed for your benefit in the above tab ["COW" - dissected](#). Note: each student should make their own figures, tables, equations, analysis, etc.

- a) The first version of your manuscript will be submitted to your Lab Instructor who will serve as one "reviewer" and "editor". The Lab Instructor will also assign two reviewers among your fellow students who will serve as additional "reviewers" of your manuscript, i.e. each of you will also have two papers to review. Note that these are supposed to be "blind" reviews, i.e. while you will know the author of the paper assigned for you to review, the author of the paper will not know who reviewed his/her paper. This will mimic a standard practice utilized by peer-reviewed journals when a submitted manuscript is sent for a review to one or more experts in the field (active researchers) to assess its scientific quality and appropriateness for publication.
- b) The Lab Instructor and other reviewers will read your manuscript and write reviews with comments, questions, and suggestions. These reviews along with the paper will be returned to you.
- c) You will also be assigned two papers to review. Your own reviews of two other manuscripts will also be graded. For each paper, you will need to prepare a written review containing questions, comments, and requests for revisions. Your response is essential to improve the quality of the papers you review, and is a very important job for an active researcher. You will submit your reviews to the Lab Instructor.
- d) You will have to respond to the reviews you receive and address all the comments/questions in the revised version of your manuscript. Both your response to the reviewers' comments and the final manuscript will be graded by the Lab Instructor. You will have to address all the comments and submit (i) the response to reviewers and (ii) the final version of your manuscript to your Lab Instructor (the "editor"). Note that not all of the reviewer's comments need to lead to requested changes in your manuscript; it is up to you to use these comments wisely and improve your paper quality. If you chose not to introduce some changes suggested/requested by the reviewer, you should provide a clear explanation in your response to the reviewer's comment as to why you chose not to do so (a "rebuttal"). The final paper along with the response to reviewers will be graded.

To provide some feedback to you about what we feel is important, a copy of the check-sheet that will be used while reading your written reports and notebooks is provided in the lab manual (page 10).

OUTSIDE CLASS

You are responsible for the following outside class:

- Pre-lab work: read the experiment manual and summarize the procedure. In some cases, you will need to predict the outcomes of the future experiment using computer models
- Analyze and organize data, make “publication quality” plot, draw conclusions
- Write a formal paper, review two other papers, and respond to your paper reviews.

GRADING POLICY

Determining the final grade:

100 pts - first notebook grading (2 completed labs)

150 pts - second notebook grading (3 completed labs)

60 pts - formal paper

50 pts - response to paper reviewers and revised paper

40 pts - your reviews of two papers

400 pts TOTAL POINTS POSSIBLE

The final grade cutoffs will be determined so that the grade distribution is similar to previous semesters. An example of the grading scale from last year is given below:

Grades	
A+	>97
A	90-97
A-	85-90
B+	82-85
B	78-82
B-	74-78
C+	70-74
C	66-70
C-	62-66
D	57-62
F	<57

ATTENDANCE POLICY

Students are expected to be present for *every meeting* of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many university-sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email or phone. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, the student or the student's representative should contact the Office of the Dean of Students via [email](#) or phone at 765-494-1747.

More than two unexcused absences will result in grading penalties of 5 points per absence after the second.

LATE ASSIGNMENT SUBMISSION PENALTY

The dates for submitting notebooks and other assignments are announced in the classroom and/or in the course schedule. Late submissions will have a penalty of 5% of the total score for the assignment per day, with up to 50% total. The latest day to turn in late assignments is 2 weeks before the Finals Week, after that, no points will be awarded for the assignment.

Academic Guidance in the Event a Student is Quarantined/Isolated

If you must miss class at any point in time during the semester, please reach out to me via Purdue email so that we can communicate about how you can maintain your academic progress. For COVID-19 concerns, please see the [PROTECT PURDUE UPDATES FOR THE SPRING 2023 SEMESTER](#). If you find yourself too sick to progress in the course, notify your adviser and notify me via email or Brightspace. We will make arrangements based on your particular situation.

Classroom Guidance Regarding Protect Purdue

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with [Protect Purdue protocols](#) is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the [Office of the Student Rights and Responsibilities](#). See also [Purdue University Bill of Student Rights](#) and the Violent Behavior Policy under University Resources in Brightspace.

TENTATIVE SCHEDULE Fall 2024 FOR all sections

Week	Dates	Activity	Due dates/Comments
Week 1	Jan 13 – 17	Course introduction Data & error analysis	
Week 2	Jan 20-24	Lab 1	
Week 3	Jan 27-31	Lab 1 cont.	
Week 4	Feb 3-7	Lab 2	
Week 5	Feb 10-14	Lab 2 cont.	
Week 6	Feb 17-21	Lab 3	
Week 7	Feb 24-28	Lab 3 cont.	Notebook due at end of the session to grade first 2 labs
Week 8	Mar 3-7	Lab 4	
Week 9	Mar 10-14	Lab 4 cont.	
Week 10	Mar 17-21		SPRING BREAK:
Week 11	Mar 24-28	Lab 5	
Week 12	Mar 31 – Apr 4	Lab 5 cont.	
Week 13	Apr 7-11	Work on Formal paper	Notebook with all data, plots, etc., due by the end of the week on Friday
Week 14	Apr 14-18	Work on Formal paper	Formal paper due on Apr 18 via email to grader.
Week 15	Apr 21-25	make-up week	Receive two papers to referee by Apr 24
Week 16	Apr 28-May 2	make-up week	Turn in your “referee reports” of two papers due on Apr 28 Response and revisions to your paper reviews due on May 2
Week 17	May 5-9	Finals week	No final exam

ACADEMIC INTEGRITY

Purdue Honors Pledge: “As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.”

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty” (*Section B.2.a of the [Student Regulations](#)*). Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of ghost-written papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest” (University Senate Document 72-18, December 15, 1972).

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor’s discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

NONDISCRIMINATION STATEMENT

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. [Link to Purdue’s nondiscrimination policy statement](#).

ACCESSIBILITY AND ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it relates to COVID-19, students may submit requests for emergency assistance from the [Critical Need Fund](#)

EMERGENCY PREPARATION

In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted on the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, sign up for Purdue Alert text messages, view www.purdue.edu/ea.
- There are nearly 300 Emergency Telephones outdoors across campus and in parking garages that connect directly to the PUPD. If you feel threatened or need help, push the button and you will be connected immediately.
- If we hear a fire alarm during class we will immediately suspend class, evacuate the building, and proceed outdoors. Do not use the elevator.
- If we are notified during class of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in [the basement].
- If we are notified during class of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in the classroom, shutting the door and turning off the lights.

Please review the Emergency Preparedness website for additional information.
http://www.purdue.edu/ehps/emergency_preparedness/index.html

MENTAL HEALTH

- If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try [WellTrack](#). Sign in and find information and tools at your fingertips, available to you at any time.
- If you need support and information about options and resources, please see the [Office of the Dean of Students](#) for drop-in hours (M-F, 8 am- 5 pm).
- If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact [Counseling and Psychological Services \(CAPS\)](#) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

VIOLENT BEHAVIOR POLICY

Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

See the [University's full violent behavior policy](#) for more detail.

DIVERSITY AND INCLUSION STATEMENT

In our activities, we may encounter a variety of challenging scientific, technical, or interpersonal issues. Overcoming these issues can help us enhance our understanding of different topics beyond physics. Everyone should remember the following points:

- We are all in the process of learning about our world, including about others and their experiences. Please speak with me, anonymously if needed, if something has made you uncomfortable.
- Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves.

COURSE EVALUATION

During the last two weeks of the course, you will be provided with an opportunity to evaluate this course and your instructor. Purdue uses an online course evaluation system. You will receive an official email from evaluation administrators with a link to the online evaluation site. You will have up to two weeks to complete this evaluation. Your participation is an integral part of this course, and your feedback is vital to improving education at Purdue University. I strongly urge you to participate in the evaluation system.